I would like to suggest that this colouring of eggs was in some way originally analogous to the change of colour observable in the chameleon and certain lizards, though by no means at the same level of development. Although it is quite possible that the colouring in some cases is protective, or has become so, it does not seem that this is a fixed rule. Why should the egg of a starling, which generally builds on house-tops, be blue? The hedge-sparrow's, again, is blue, while the thrush's is blue spotted with black, and the blackbird's is green, though the position of their nests is vastly similar. Again, on examining the excellent "clutches" at the Natural History Museum which exhibit the additional cuckoo's egg, one is struck by the variation in shade, which, according to observers, is matched by the bird itself.

It seems to me that the elucidation of this problem would be of great value in such vexed questions as the inheritance of acquired characteristics, and might be really illustrative of the exact processes of evolution.

R. L. LESLIE.

13 Electric Mansions, Brixton, S.W., December 1.

The Terminal Velocity of Fall of Small Spheres in Air.

AT the recent Winnipeg meeting of the British Association we presented some results on the terminal velocity of fall of approximately spherical spores, which were not in agreement with Stokes's formula (see NATURE, October 14, p. 472). We have succeeded since in making minute spheres of paraffin wax, a certain black wax, and mercury, and have determined their terminal velocities over a wide range of sizes by the same method as in the preceding investigation. The velocities obtained for these spheres are in close agreement with Stokes's formula. The reason for the deviations in the former cases is not clear.

JOHN ZELENY.
L. W. MCKEEHAN.

University of Minnesota, November 23.

THE PROPHYLAXIS OF TROPICAL DISEASES.

THE history of tropical medicine, or what might be called its recent twentieth century renaissance, will go down to posterity as one of the most remarkable chapters in medicine. In a book entitled "Mosquito or Man? The Conquest of the Tropical World,"[1] Sir Rubert Boyce endeavours, in his own words, to epitomise this wonderful movement, a movement initiated in England by the then Secretary of State for the Colonies, Mr. Joseph Chamberlain, and by Sir Patrick Manson, a physician who had practised in the East, and had returned home imbued with the idea that the diseases of the tropics stood, so to speak, by themselves, and thus required special teaching in the medical schools of this country. The idea gained ground; two tropical schools, one in London, one in Liverpool, were founded, as Sir Rubert describes in his first chapter, and from that day onwards things have never looked back. Discovery after discovery have poured from these schools until now we stand on the threshold of a new world, a tropics as healthy as a temperate clime.

FIG. 1.—Water-logged Anopheline Breeding Land, Belize. From "Mosquito or Man?"

There apparently is nothing new under the sun, not even in medicine; the author describes in his fourth chapter how Sir Henry Blake, when Governor of Ceylon, had been shown a medical work written fourteen hundred years ago, in which the mosquito was stated to be a carrier of disease, and in which malaria was described as being transmitted by flies or mosquitoes—a truly prophetic utterance. More recently than this certainly, but yet, as things go now, of older

[1] "Mosquito or Man? The Conquest of the Tropical World." By Sir Rubert Boyce, F.R.S. Pp. xvi+267. (London: John Murray, 1909.) Price 10s. 6d. net.

times, Beauperthuy, in 1853, practically said the same thing, and had he but had a disciple of the worth of Ross the thing would have been settled long ago, and the gain to humanity have been the saving of millions of lives. Unfortunately, neither he nor King nor Finlay could prove the truth of their assertions, so it was left for Manson to revive the view once again, and this time at last a worker—Prof. Ross—came forward, and by a brilliant piece of research work solved the mystery once and for all. Long before this, Manson had also shown that the *Filaria bancrofti* underwent a metamorphosis or development in the tissues of a mosquito, and Low had subsequently proved—not Manson, as the author erroneously states on p. 36—that after this development was complete, the parasites found their way into the proboscis, and so got back to man when the insect bit again.

samples of what may be done. He has complained at times of the slowness with which this new sanitation has moved in some of the British Colonies, and certainly, as compared with American dependencies, it has been slow; but now, as chapters viii. and xiv. of "Mosquito or Man?" show, the movement is advancing, most of the West Indian islands, terrified by the fear of yellow fever, the scourge of these parts, having now got definite ordinances and regulations dealing with the question of breeding grounds of mosquitoes.

The historical survey of yellow fever contained in chapter xi. gives an idea of what these places were like in the old days, Fergusson telling how 1500 soldiers had perished in one epidemic, while in another instance the Secretary for War in England wanted to know from the Governor of British Guiana why in

FIG. 2.—Too much Bush. Georgetown, Demerara. The effect is to obscure Sunlight and Fresh Air. From "Mosquito or Man?"

The Americans in Havana, profiting by Ross's work on malaria in the mosquito, tried mosquitoes for yellow fever, and by a series of experiments proved that a mosquito, the *Stegomyia calopus*, is the sole agent in the transmission of this disease. Here, then, were three of the most important tropical diseases clearly proved to be carried by mosquitoes, and, the cause having been ascertained, there only remained the question of prevention. How difficult it is to break down old traditions, and the antagonism that was displayed to the men of science who were sent out to preach the new doctrines are well brought out in chapter iii.; even to the present day there are members of the medical profession who disbelieve in the mosquito, *vide* p. 118. Ross at once, after his researches on the development of the malarial parasite in the mosquito, advocated a war against these insects as being the rational method of cutting the cycle and stamping out the disease, and his original campaigns and subsequent ones—Ismailia, for example—are

a few months 69 per cent. of the white troops had perished. The churchyards of Barbados and the other islands are full of the bones of the victims, and it is said of the slopes of the Morne in St. Lucia that there is not a square yard without the remains of a soldier under it, more being there from the results of yellow fever than from the bullets of the enemy. Now what do we find? Let us refer to chapter xiv., which contains an account of the anti-yellow fever campaign in Havana, 1900. As Sir Rubert says, "This will always remain one of the first and one of the greatest examples of what has been done to stamp out a disease by concerted intelligent action, and using the latest and most modern weapons. When the American Government took over the administration of Cuba, one of the first things to be done was to make Havana a livable place. Hitherto it had been notoriously unhealthy, 35,952 persons perishing of yellow fever between the years 1853–1900, this being equivalent to 754 a year, 64 a month, or to 2 deaths a day;

and now, after General Woods, Colonel Gorgas, Guiteras, Finlay, and others took the situation firmly in hand, and organised a thoroughly efficient sanitary administration and a special raid upon the breeding places of the Stegomyia, the death-rate for Cuba has come down to between 11–17 pro mille. In 1907, only one case of yellow fever was reported in Havana."

Panama, New Orleans, and every other place treated in a like manner have given similar results, and certainly no sane individual will be found who, after reading "Mosquito or Man?" will deny that the mosquito is the only transmitter of yellow fever, and the remarkable results that follow its destruction.

Equally remarkable are the results that follow the extermination of anophelines for malaria. It was computed that Ismailia (p. 65), already mentioned, in 1886 had every inhabitant infected. Ross began his anti-malarial campaign there in 1901; by 1904 the cases were diminishing fast, until in 1905, 1906, 1907, and 1908, there were no new cases at all, indicating that the disease had been entirely stamped out. One would like to multiply further examples, but space forbids; those desiring more must read the book for themselves. There is little to criticise adversely in the work. Of omissions one might notice what was the first anti-malarial and yellow-fever campaign in the West Indies, namely, that conducted on the Morne and Vigie in St. Lucia in the year 1901, and also the pioneer work done on the destruction of mosquitoes for filariasis in Barbados.

Of errors, on p. 128, in the sentence "then after a latent period of three days the Stegomyia," &c.—should manifestly read "thirteen" days. On p. 133, "Man suffering from yellow fever after the fifth day is the reservoir" should read "Man suffering from yellow fever on the second or third day or before the fifth is the reservoir."

The book is clearly and ably written, is most interesting to read, is nicely illustrated by beautiful photographs, and we cannot do anything but praise the author for its production.

INDUSTRIAL EDUCATION.

TECHNICAL education may be regarded as falling naturally into two main divisions, (1) the education of the higher ranks of those engaged in industrial work, and (2) the education of the rank and file. From time to time one or other of these divisions occupies the more prominent place in the public interest. Recently, probably as a result of the discussions following the publication of the reports of the Poor Law Commission, special prominence has been given in the Press and elsewhere to the problem of the industrial education of those who will become in the near future the skilled workmen, artisans, and craftsmen of this country. Two recent attempts to influence public opinion in this matter may be here briefly recorded. Probably the more useful of the two is an attempt to organise a National Industrial Education League, the main object of which, in the language of its promoters, is "to make elementary education go hand in hand with industrial training, and to stop the criminal waste of the nation's best asset by giving our boys, before leaving school, a sound elementary industrial training." This proposal "has already received the approval of fifty-seven trades' councils, and of the representatives of 3,000,000 of industrial workers." In addition, promises of support have been received from many large employers of labour, distinguished educationists, and well known public men. Special stress is laid upon the fact that, "while the present system of technical education has benefitted many, it has left uncared for, and can never reach, the bulk of the children who are destined to become industrial workers."

The second recent noteworthy attempt to arrive at some definite agreement in the matter was a conference held on Friday, December 3, at the Mansion House, at the invitation of the Lord Mayor, to consider (1) the development of industrial training in both elementary and trade schools, and (2) the organisation of facilities for bringing boys and girls who are leaving the public elementary schools into better touch with the openings that exist in the industrial and commercial world. The conference was attended by a number of representatives of the London County Council Education Committee, many large employers of labour, and delegates from trades unions. It is probable that the London County Council, at whose suggestion the conference was called, will not profit much by the deliberations of the conference. As no definite resolutions were submitted for discussion, there was a tendency to neglect general principles and treat side-issues only. Running throughout most of the speeches, however, was a belief in the impossibility of reviving the old system of apprenticeship and the consequent necessity for some form of educational work to give the necessary industrial training formerly supplied by the apprenticeship system.

Interest in industrial education is now extending to the political parties. Thus the National Union of Conservative and Constitutional Associations, at its recent annual meeting in Manchester, passed a resolution urging

"that the Conservative leaders at once push forward a scheme of development of technical, scientific, and agricultural education for Great Britain and Ireland, and that this scheme must be linked with the system of primary education."

On the other side of the political platform, the Labour party has passed resolutions at recent conferences demanding a free national system of primary, secondary, university, and technical education. At the forthcoming annual conference of the Labour party to be held in January, 1910, the conference will be asked

"to observe the increasing tendency to make use of boy and girl labour in monotonous and uneducational industrial work as fatally destructive in its results upon the health, character, and subsequent industrial efficiency of the boys and girls themselves . . . and to urge upon the Government the desirability of so amending the Factory and Education Acts as to secure to every boy and girl between the ages of fourteen and eighteen efficient physical and technical training."

As the question of industrial education is one which affects the working classes more than any other section of the community, it is obvious that any future legislative action on the matter will be considerably influenced by expressions of opinion from bodies such as the Labour party and the trades unions. There is a danger that organisations of this type may be tempted to use their influence to give an unduly utilitarian bias to the education of boys and girls in the elementary and continuation schools. This danger is, however, more apparent than real, as is shown by (1) the vigorous support given by trades unions and similar bodies to the Workers' Educational Organisation, the object of which is to secure university education in literature, history, political economy, and the like for working men, and (2) the general undercurrent of opinion among workmen that the financial benefits of trade and technical education will ultimately fall to the employer and not to the workman.

At the present time much controversy is taking place respecting the question of apprenticeship. Is it desirable to revive the system of apprenticeship, and if